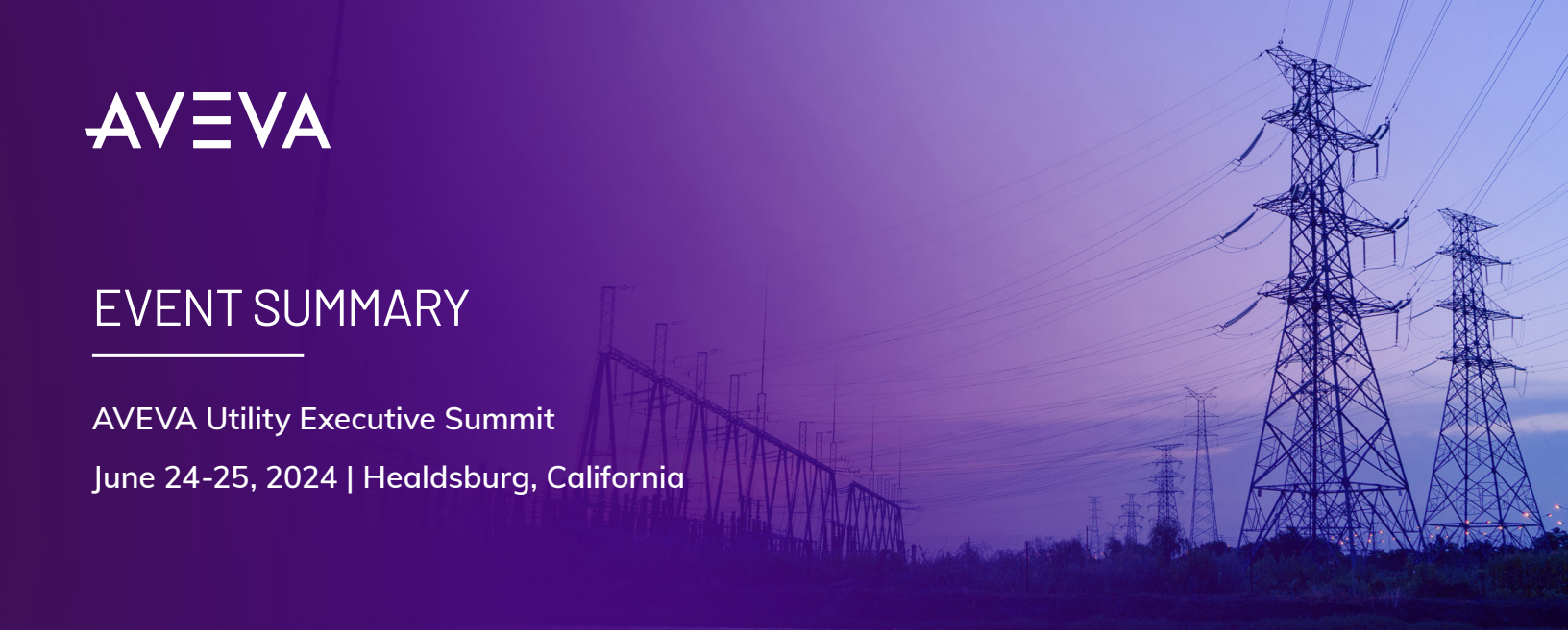

EVENT SUMMARY

AVEVA Utility Executive Summit

June 24-25, 2024 | Healdsburg, California

As a longstanding digital technology partner to the power industry, AVEVA brought together electric utility executives from across the Americas to discuss a vision and strategy for advancing grid infrastructure.

Here is what we learned

Industry challenges: The accelerating pace of grid transformation

With global power demand set to more than double by 2050,[1] the power industry must meet this growing demand while navigating stricter environmental mandates, the ever-increasing impact of climate change, supply-chain disruptions, inflation, cybersecurity and physical security threats, and increasingly complex grids.

The issue lies with not just the amount of change required, but the rapid pace of change necessary to meet the energy transition demands. These challenges—while particularly pertinent in the continental United States—are global in scale and require a collaborative, innovative approach.

The rapid growth of electrification, data centers, and AI is affecting the grid load and demand. There is a pressing need for new and green resources to ensure we meet our net-zero goals. Utilities must deal with the difficulties of constructing new transmission lines and interties to access distant and varied renewable sources, thereby increasing the share of solar, wind, hydro, and nuclear in their portfolios.

The growth of these renewable energy sources will demand fast grid change, added energy storage capacity, and more intelligent grid control capabilities enabled by sophisticated technologies, such as AI. Demand response programs and technologies are key to lowering peak load and enhancing customer involvement.

[1] Mckinsey & Co. “Global Energy Perspective 2023: Power outlook.” January 16, 2024.

Additionally, the effects of climate change are accelerating. Wildfires, high heat, and other extreme weather events, such as flooding and icing, will increasingly affect grids.

There will be significant impacts on the grid assets and capacity challenges. In response, utilities will need to harden the grid through physical means (undergrounding lines) and digital means (improved situational awareness and visibility).

Rural and tribal communities must be resilient and prepared for emergencies and weather events. For these communities, distributed energy resources (DERs) and microgrids are essential for providing fair access to carbon-free resources.

To achieve successful results, stakeholders need to work together and communicate openly.

To reduce the carbon footprint of the grid, enhance its reliability, and offer cost-effective, customer-focused services, utilities need to have access to dependable data that can provide instant insights and analytics for grid operation and load planning,

We know that the energy transition will present challenges. However, there are also opportunities, such as the role of technology and innovation in supporting decision-making, asset management, and power grid reliability. Technology will help utilities manage the growing demand for electricity and mitigate the impact of climate change on the grid infrastructure.

Key takeaways: Innovation, resiliency, equitability, collaboration

The industry goals shared were multifaceted and interdependent. They include:

Increasing capacity and efficiency

Capacity—the ability to meet peak demand—is the number one issue, not total energy production. With ever-growing electricity demand, utilities need to ensure that renewable energy sources can scale up to provide far more energy than existing traditional power sources, especially during peak times. With increased automation, utilities can benefit from better oversight. Data analysis and machine learning tools can help utilities optimize their operations and make more informed decisions regarding their energy transition.

Transforming the grid

Transitioning to smart grids and new customer services requires utilities to address complex regulatory, cultural, and partnership issues. Infrastructure upgrades are essential to integrate renewable energy and battery energy storage while maintaining reliability. Technology and innovation play crucial roles in decision-making, asset management, and power grid optimization, as utilities face the effects of more electricity demand and climate change on grid infrastructure.

Improving data visibility and accessibility

Understanding and managing the grid requires vast amounts of data. Whether for better planning, forecasting, and modeling or enhancing operational decisions, utilities need to establish reliable data flows across multiple sources and assets to deliver actionable information in real time. Utilities must adopt software solutions and tools that streamline grid management and integration and improve efficiency.

Using digital tools to optimize asset planning

For effective substation and asset strategy and planning, engineers and planners need an authoritative “single version of truth” that enables digital engineering. This unified data source can leverage the simulation and planning tools in scalable architectures. These planning solutions promote efficiency, reduce engineering errors, shorten engineering cycles, optimize resource allocation and accelerate project timelines.

Improving load forecasting and planning

Utilities are turning to technology to plan in a scaled and standardized way, using analytics for load forecasting, load planning, future asset reallocation, and expansion. By aggregating weather and operations data, demand patterns, future renewable prediction models, and social and economic impacts, utilities can apply analytics for better, more accurate forecasting and compare scenarios for short- and long-term planning.

Incorporating batteries and microgrids

Batteries and energy storage management systems can help increase the penetration of solar energy on the distribution system and manage voltage, frequency, power quality, and congestion on the distribution system. Microgrids provide secure energy independence for critical facilities while enabling tribal sovereignty, allowing communities to manage their own energy resources. Both battery and microgrid technologies contribute to grid resilience and the transition to a more sustainable energy landscape.

Using advanced analytics to mitigate climate risks

As climate change intensifies extreme weather events, utilities are incorporating improved weather modeling into their day-to-day operations to enhance resilience to hurricanes, flooding, wildfires, ice storms, and other climate-related risks. For example, utilities are using next-generation technology such as machine-learning algorithms to predict wildfire ignition potential based on variables such as storms, heat waves, humidity levels, and wind speeds and direction. These advanced analytics enable utilities to proactively manage risks, optimize resource allocation, and improve overall grid reliability and resilience in the face of increasing climate challenges.

Integrating DERs to optimize grid investments

DERs on the demand side are emerging as a key solution for load management. To effectively integrate the rapidly growing market of DERs across residential and industrial and commercial customers, utilities need to know what is connected to the distribution system. Transparency and sharing their operational information enables better coordination and utilization of these diverse resources. Utilities must also develop advanced prediction and management capabilities to anticipate when and where DERs—including rooftop solar and electric vehicle charging stations—will impact the grid, preventing overloads and ensuring stability. This way, utilities can optimize investments, improve efficiency, and support the transition to a more resilient and flexible system.

Partnering with key stakeholders

Collaboration among utilities, academia, research organizations and technology suppliers fosters innovation, combining practical industry knowledge with cutting-edge research and technological expertise. These collaborations will be critical to speed up innovation for grid transformation and energy transition. Moreover, communities are a key voice in decision-making, and it is essential as they provide insights on local needs and priorities. Their opinions are important in discussions on reliability, resilience, and equity—ensuring grid modernization efforts align with community expectations and values and contribute to a just energy transition.

Collaborating with regulators and policymakers

Open dialogue and collaboration with regulators will help utilities address the challenges and opportunities that come with the energy transition. It is also essential to educate policymakers and other stakeholders on the benefits of grid modernization. In this way, utilities can garner support and facilitate and accelerate progress.

Achieving affordable net zero

With budget constraints and slimmer margins, delivering affordable, customer-centric services is more important than ever. By optimizing grid operations with data management, data analytics, and predictive tools, utilities can reduce costs for suppliers, customers, and themselves. This approach not only improves operational efficiency but also supports the transition to net-zero emissions without compromising affordability.

Improving clean energy in rural and remote areas

It is critical to supply equitable power initiatives to remote and disadvantaged communities and indigenous tribes. Engaging these communities in the conversation and promoting their energy autonomy is key. Rural grid resilience requires innovative partnerships that span communities, public and private sectors, technology suppliers, and research organizations.

Engaging customers to facilitate the transition

Demand response programs can support the rapid integration of DERs such as solar, battery, and electric vehicles into the grid, actively involving customers in the energy transition.

Enhancing grid performance and resiliency

Industry-specific technologies are crucial for improving grid performance and resiliency. These include grid-edge intelligence, microgrids, advanced distribution management systems (ADMS), outage management systems (OMS), distributed energy resource management systems (DERMS), next-generation advanced metering infrastructure (AMI 2.0), and smart-meters.

Hardening the grid

Utilities are increasingly focused on grid-hardening techniques to enhance resilience against climate-related risks. Undergrounding the networks is a key strategy that helps reduce vulnerability to wildfires, floods, and other extreme climate events while achieving longterm cost savings through reduced maintenance and outage recovery expenses. Fiber optic network, grid-edge and smart-meter technology will support more distributed and diverse resources, enhancing grid flexibility and responsiveness.

Improving security posture

The rise of malicious attacks on assets such as substations requires a proactive response. Robust security governance for both physical assets (transformers, edge devices, and communications) and digital assets (software) is critical. This vigilance helps protect all utility assets, maintaining and protecting system integrity and ensuring reliable delivery service.

Why utilities are partnering with AVEVA

At AVEVA, we partner with utility companies on their digital transformation journeys to meet these goals. AVEVA is proud to help businesses achieve momentum through operational and efficiency improvements.

Utilities use our industry-leading AVEVA™ PI System™ and cloud-enabled portfolio of software solutions to enable advanced analytics, AI, asset performance management, and more for sustainable, resilient grid management.

Find out more